



POLITEKNIK ATMI SURAKARTA

Kampus I : Jl. Mojo No. 1 Surakarta 57145. Phone : +62 271 714466 • Fax : +62 271 714390

Kampus II : Jl. Adi Sucipto Km 9,5 Karanganyar 57174. Phone: +62 271 7686220

Kotak Pos 215 Surakarta 57102, Jawa Tengah, Indonesia.

E-mail: politeknik@atmi.ac.id • Website <http://www.atmi.ac.id>

Zwick / Roell

Tensile Test report

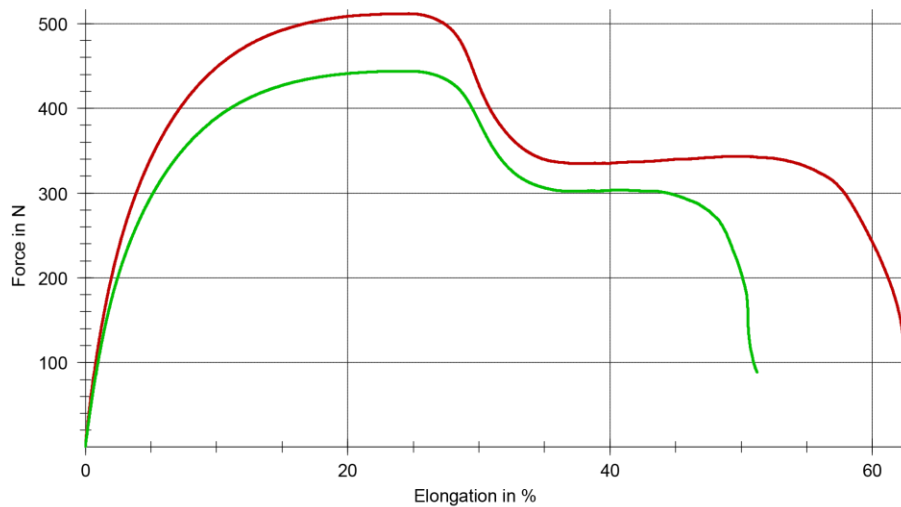
Customer : Dicky Handika Setia Putra Notes : Raw Material
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding

Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	511,71	601	22,5	25	4,49	62	4,19	5,42
	2	443,89	517	20,0	25	4,00	51	4,19	5,3

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
x	477,80	559	21,3	25	4,24	57	4,19	5,36
s	47,96	59,6	1,80	0,089	0,346	7,9	0,000	0,08485
v [%]	10,04	10,66	8,46	0,36	8,17	13,97	0,00	1,58



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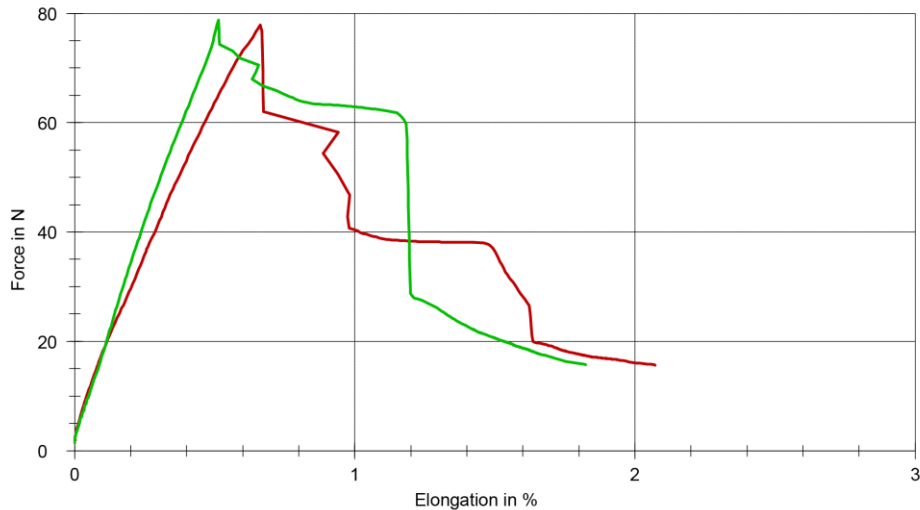
Tensile Test report

Customer : Dicky Handika Setia Putra Notes : Sambungan Lem Plastik Steel
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding
 Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E _t MPa	σ _M MPa	ε _M %	σ _B MPa	ε _B %	h mm	b mm
	1	77,90	555	3,60	0,66	0,724	2,1	4,16	5,2
	2	78,74	736	3,56	0,51	0,712	1,8	4,22	5,24

Series graph:



Statistics:

Series	Force N	E _t MPa	σ _M MPa	ε _M %	σ _B MPa	ε _B %	h mm	b mm
n = 2								
\bar{x}	78,32	646	3,58	0,59	0,718	1,9	4,19	5,22
s	0,59	128	0,0285	0,11	0,00810	0,17	0,04243	0,02828
v [%]	0,76	19,75	0,80	17,93	1,13	8,96	1,01	0,54



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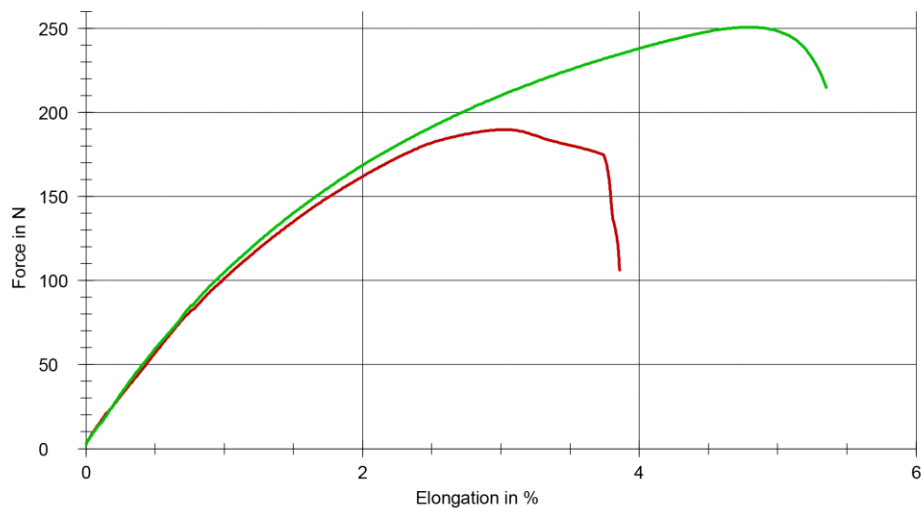
Tensile Test report

Customer : Dicky Handika Setia Putra Notes : 10/3 5800 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding
 Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	189,68	421	7,54	3,0	4,23	3,9	4,38	5,74
	2	250,51	454	9,77	4,8	8,37	5,4	4,58	5,6

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
x	220,10	438	8,66	3,9	6,30	4,6	4,48	5,67
s	43,02	23,2	1,57	1,2	2,93	1,1	0,1414	0,09899
v [%]	19,55	5,31	18,16	31,99	46,49	22,98	3,16	1,75



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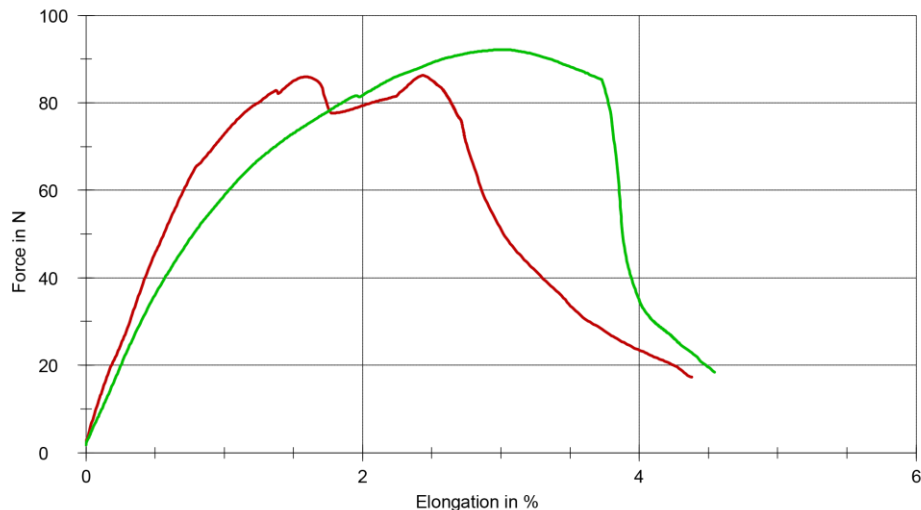
Tensile Test report

Customer : Dicky Handika Setia Putra Notes : 10/3 6000 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding
 Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	86,25	302	3,09	2,4	0,618	4,4	4,9	5,7
	2	92,14	276	3,59	3,0	0,716	4,5	4,54	5,66

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
x	89,20	289	3,34	2,7	0,667	4,5	4,72	5,68
s	4,16	18,4	0,352	0,40	0,0697	0,12	0,2546	0,02828
v [%]	4,66	6,38	10,54	14,74	10,46	2,64	5,39	0,50



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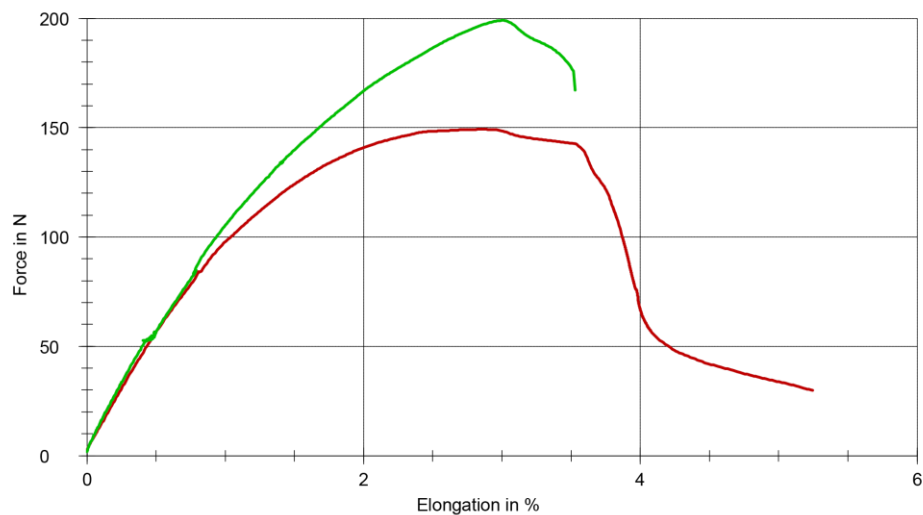
Tensile Test report

Customer : Dicky Handika Setia Putra Notes : 10/3 6200 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding
 Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	149,25	407	5,45	2,8	1,09	5,2	4,74	5,78
	2	199,03	458	7,54	3,0	6,33	3,5	4,65	5,68

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
\bar{x}	174,14	432	6,49	2,9	3,71	4,4	4,695	5,73
s	35,20	36,0	1,48	0,11	3,71	1,2	0,06364	0,07071
v [%]	20,21	8,33	22,74	3,64	99,92	27,66	1,36	1,23



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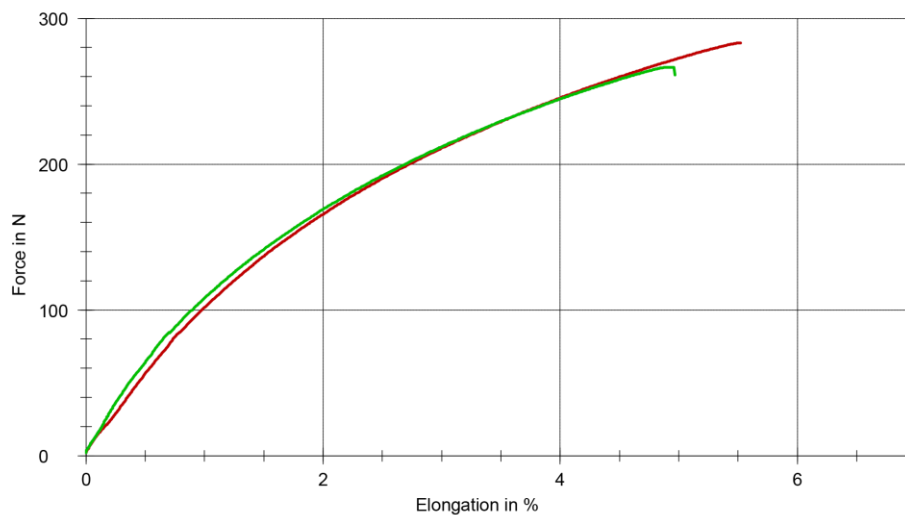
Tensile Test report

Customer : Dicky Handika Setia Putra Notes : 15/3 5800 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding
 Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	283,20	363	10,6	5,5	10,6	5,5	4,74	5,62
	2	266,51	501	9,77	4,9	9,77	4,9	4,75	5,74

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
x	274,86	432	10,2	5,2	10,2	5,2	4,745	5,68
s	11,80	97,6	0,606	0,42	0,606	0,42	0,007071	0,08485
v [%]	4,29	22,57	5,93	8,14	5,93	8,14	0,15	1,49



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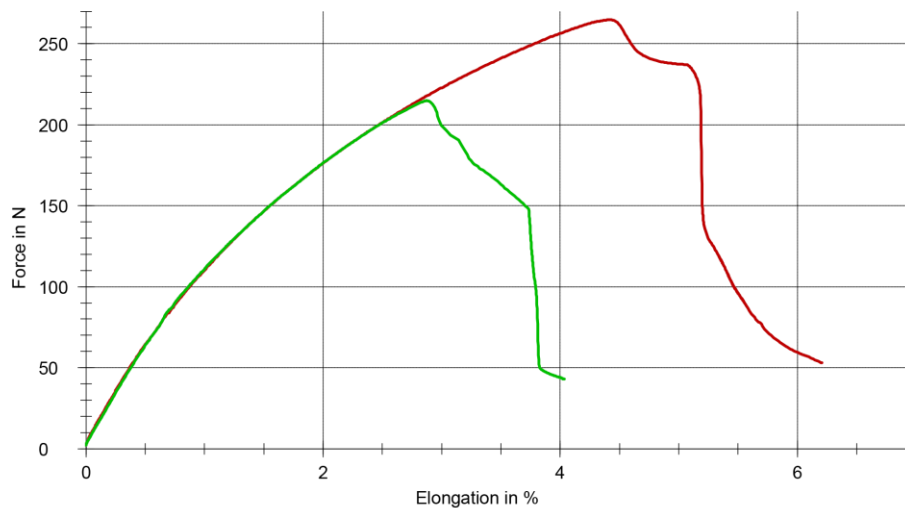
Tensile Test report

Customer : Dicky Handika Setia Putra Notes : 15/3 6000 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding
 Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	264,74	487	10,2	4,4	2,04	6,2	4,62	5,62
	2	214,80	467	7,95	2,9	1,59	4,0	4,74	5,7

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
x	239,77	477	9,07	3,6	1,81	5,1	4,68	5,66
s	35,32	14,2	1,59	1,1	0,318	1,5	0,08485	0,05657
v [%]	14,73	2,98	17,51	29,96	17,50	30,01	1,81	1,00



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Tensile Test report

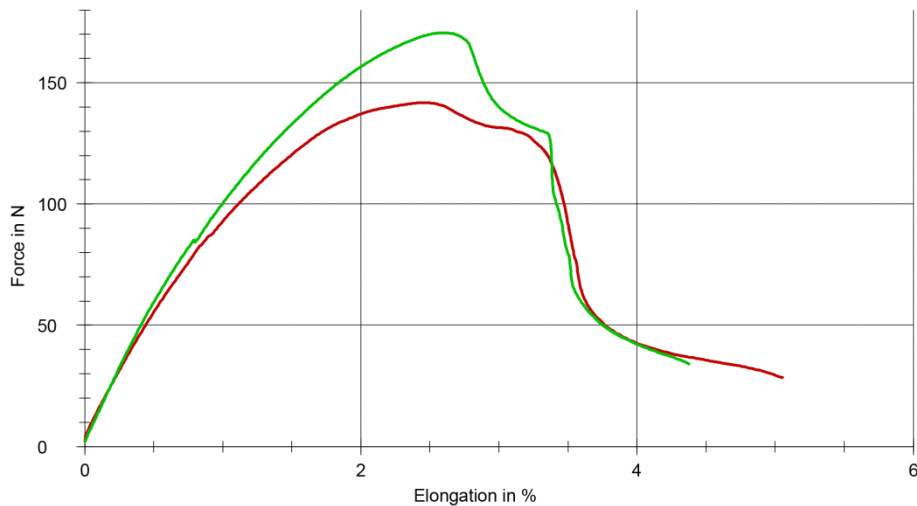
Customer : Dicky Handika Setia Putra Notes : 15/3 6200 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding

Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	141,85	421	5,59	2,4	1,12	5,1	4,47	5,68
	2	170,61	471	6,64	2,6	1,33	4,4	4,51	5,7

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
\bar{x}	156,23	446	6,11	2,5	1,22	4,7	4,49	5,69
s	20,34	35,0	0,742	0,11	0,149	0,48	0,02828	0,01414
v [%]	13,02	7,85	12,15	4,25	12,18	10,19	0,63	0,25



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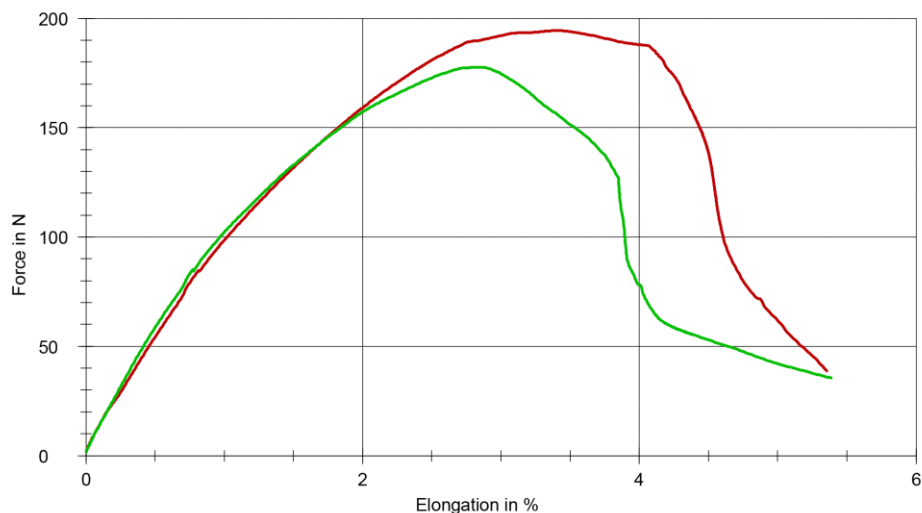
Tensile Test report

Customer : Dicky Handika Setia Putra Notes : 20/3 5800 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding
 Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	194,40	420	8,06	3,4	1,61	5,4	4,29	5,62
	2	177,67	466	7,22	2,8	1,44	5,4	4,35	5,66

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
\bar{x}	186,03	443	7,64	3,1	1,53	5,4	4,32	5,64
s	11,83	32,4	0,599	0,41	0,119	0,023	0,04243	0,02828
v [%]	6,36	7,32	7,84	13,04	7,78	0,42	0,98	0,50



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Tensile Test report

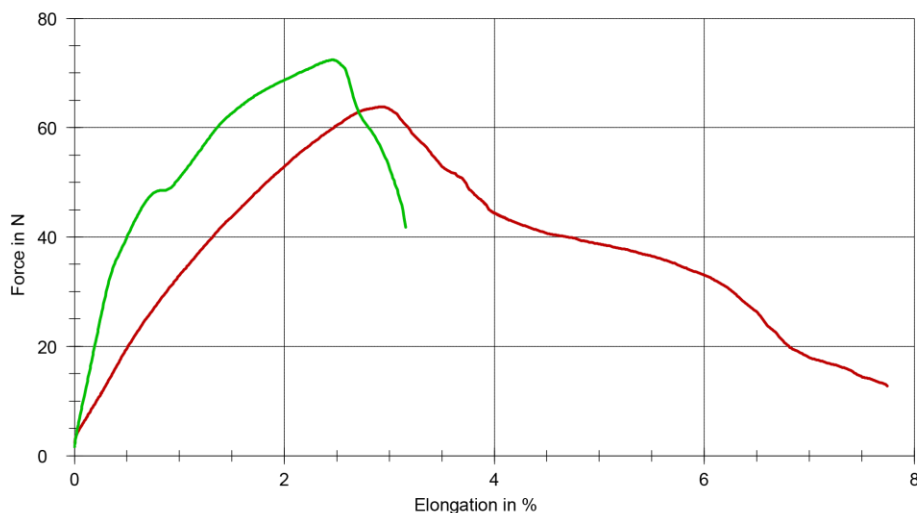
Customer : Dicky Handika Setia Putra Notes : 20/3 6000 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z020
 Material : Nylon Friction Stir Welding

Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E _t MPa	σ _M MPa	ε _M %	σ _B MPa	ε _B %	h mm	b mm
	1	63,82	125	2,52	2,9	0,503	7,7	4,53	5,6
	2	72,39	382	3,01	2,5	1,73	3,2	4,3	5,6

Series graph:



Statistics:

Series	Force N	E _t MPa	σ _M MPa	ε _M %	σ _B MPa	ε _B %	h mm	b mm
n = 2								
\bar{x}	68,11	253	2,76	2,7	1,12	5,5	4,415	5,6
s	6,06	182	0,347	0,32	0,870	3,2	0,1626	0,000
v [%]	8,90	71,81	12,56	11,82	77,79	59,51	3,68	0,00



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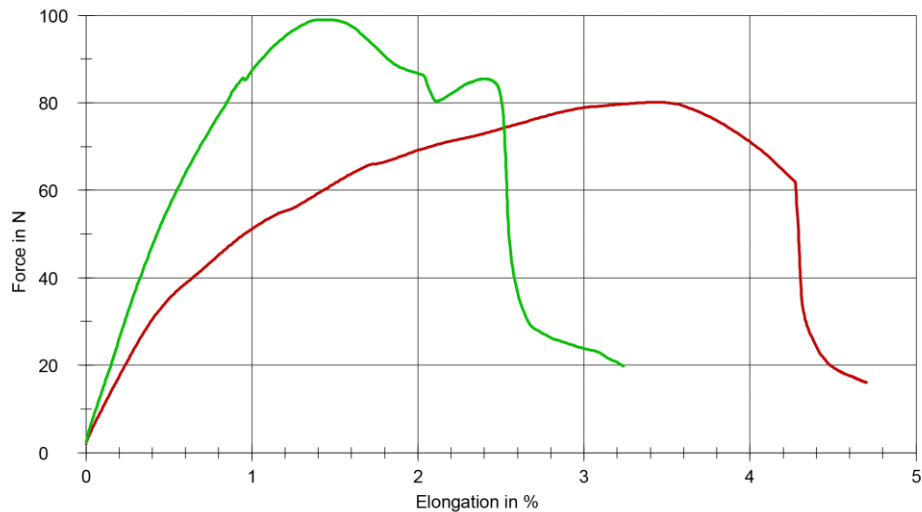
Tensile Test report

Customer : Dicky Handika Setia Putra Notes : 20/3 6200 rpm 4mm/min
 Test standard : ASTM D 638 Tipe 4 Machine data : Zwick Z200
 Material : Nylon Friction Stir Welding
 Pre-load : 0,1 MPa
 Speed, tensile modulus : 5 mm/min
 Test speed : 5 mm/min
 Grip to grip separation at the start position : 65,00 mm
 Gage length, standard travel : 25 mm
 Elongation preset, secant modulus : 1 %

Test results:

Legend	No.	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
	1	80,15	278	3,06	3,4	0,611	4,7	4,64	5,64
	2	98,97	445	3,81	1,4	0,763	3,2	4,6	5,64

Series graph:



Statistics:

Series	Force N	E_t MPa	σ_M MPa	ϵ_M %	σ_B MPa	ϵ_B %	h mm	b mm
n = 2								
x	89,56	362	3,44	2,4	0,687	4,0	4,62	5,64
s	13,31	118	0,532	1,4	0,107	1,0	0,02828	0,000
v [%]	14,86	32,60	15,46	59,26	15,56	26,05	0,61	0,00

Hasil Uji Kekerasan


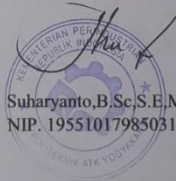
Nama : Dicky Handika Setia Putra

Material : Nylon 6 Friction Stir Welding

DATA HASIL PENGUJIAN KEKERASAN

Kode Sampel	Pengulangan (HD)
20/3.6000.4	1. 70,5 2. 44,5 3. 60,5

Yogyakarta, 23 April 2019
Kepala Laboratorium Pengujian


Suharyanto, B.Sc.S.E.M.M
NIP. 19551017985031002


Hasil Uji Kekerasan

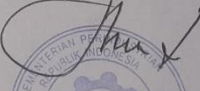
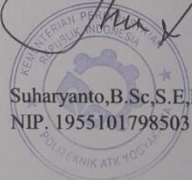
Nama : Dicky Handika Setia Putra

Material : Nylon 6 Friction Stir Welding

DATA HASIL PENGUJIAN KEKERASAN

Kode Sampel	Pengulangan (HD)
15/3.5800.4	1. 80,5 2. 62,5 3. 67

Yogyakarta, 23 April 2019
Kepala Laboraturium Pengujian

Suharyanto, B.Sc, S.E, M.M
NIP. 19551017985031002